container negative terminal electrically connected to said second container positive terminal, said housing substantially containing said first and second container.

29. The multiple cell battery of claim 12, wherein at least one of the said first and second battery cells comprises one of an electrochemical cell and a voltaic cell.

REMARKS

Claims 1-12, 14-22, and 24-29 remain in this case and are presented for the Examiner's reconsideration in light of the above amendments and the following comments.

I. Formal Matters

Claims 1 and 24 have been amended to claim a battery comprising a battery cell having "an internal impedance" and the predetermined condition "being substantially determined by the internal impedance." These amendments are supported by the specification as originally submitted on page 44, lines 9-11, page 45, lines 1-9, and FIG. 10. Claim 12 has been amended to electrically couple the first and second containers in series. This amendment is supported by the specification as originally submitted on page 15, lines 35-41, page 16, lines 1-5, and FIG. 6.

New Claims 28 and 29 have been added. Support for new Claim 28 is found in claim 13 and the specification on page 12, lines 25-38, and FIG. 6, as originally presented. Support for new claim 29 is found in Claim 23 as originally presented. No new matter has been added.

II. Invention Summary

Applicants' invention is directed toward a battery that provides a longer service run time by optimally using the stored charge of a primary or rechargeable battery before charging. The battery has a built-in controller that includes a converter, which may be capable of operating below the voltage threshold of typical electronic devices. The controller more efficiently regulates the voltage of the electrochemical cell and allows for a controlled discharge or an optimal discharge depth in order to extend the service run time of the battery.

Before turning to a discussion of the prior art and the Examiner's rejection of the claims, it is to be noted that Independent Claims 1, 12 and 24 have been amended to better define the invention. Claims 1 and 24 recite a battery cell having "an internal impedance" and the predetermined condition "being substantially determined by the internal impedance." Claim 12 has been amended to electrically couple the first and second containers in series.

III. 35 U.S.C. § 103(a)

Claims 1-7 and 24-27 stand rejected under 35 U.S.C. §103(a) over *Nagai et al.* Applicants respectfully traverse this rejection. The discussion of the *Nagai* reference previously made of record remains in effect, but will not be repeated for the sake of brevity. However, the Examiner is respectfully urged to consider the following additional matters that distinguish Applicant's invention as now presented by amendment over the references:

1. Specifically, *Nagai* measures impedance across FET 2. *See* col 6, lines 26-33 and FIG. 2.
2. *Nagai* measures voltage across resistor R0 and monitors voltage across R0 as a function of the reduction of the impedance, Z, during the discharge operation. *See id.*
3. In sharp contrast with *Nagai*, Applicants' invention as disclosed in Claims 1 and 24 require measurement of the battery voltage and current by intentionally applying an AC load. Additionally, Applicants' invention simulates an AC load that allows measurement of the phase shift of voltage and current allowing measurement of internal battery impedance. This is not disclosed in *Nagai*.

outside slope

It is submitted that there is no suggestion in the Nagai reference to replace the battery with Applicant's disclosed battery and container. Absent any motivation to replace a battery comprising a controller responsive to detection of the internal impedance of the battery with the measurement of a fixed resistance, the rejection under 35 U.S.C. § 103(a) is improper and should be withdrawn. *See* M.P.E.P § 2143.01.

The Examiner also rejected Claims 12, 14, and 23 over *Stewart*. Applicant also respectfully traverses this rejection and requests reconsideration and withdrawal of this rejection. The prior discussion of the *Stewart* reference is equally applicable here and will not be repeated. In addition, it should be noted that *Stewart* requires parallel connection of the batteries and power controllers to form a common output voltage line. *See* col. 3, lines 48-52, and FIGS. 1 and 2. Additionally, this common output voltage line comprises a DC power bus to transmit the output from the battery modules to the system primary load. Applicants now require in amended Claim 12, a series connection of the battery cell containers. Thus, *Stewart* does not suggest using Applicant's series connection of containers and respectfully request the Examiner withdraw this 35 U.S.C. § 103 rejection.

The Examiner also rejected Claims 8-11 over *Nagai* in view of *Stewart*. The prior discussion of the *Nagai* and *Stewart* references are equally applicable here and will not be repeated. Since Claims 8-11 depend directly from Claim 1, the limitations of Claim 1 are incorporated into dependent Claims 8-11. *Nagai* in view of *Stewart,* either singly or in combination, does not disclose, teach, or suggest Applicants' claimed battery comprising a container, a battery cell having an internal impedance, and a circuit that uncouples the output voltage of a controller upon determination of the internal impedance of the battery. Applicants therefore respectfully requests reconsideration and allowance of dependent Claims 8-11 over the Examiner's 35 U.S.C. §103(a) rejection.

Claim 13 was also rejected over *Stewart* in view of *Schambaugh*, U.S. Patent No. 4,418,127. In the response to paper 5, claim 13 was cancelled without prejudice. Thus, Applicants' response was responsive to this ground of rejection. However, the limitations of Claim 13 have been added as new claim 28. Therefore, Applicants will direct the arguments toward the Examiner's rejection of Claim 13 to new claim 28. The previous arguments regarding the *Stewart* reference remain in effect and will not be repeated for breverical reasons. The

Examiner is further urged to consider the following additional matters that distinguish Applicant's invention as now presented by amendment over the references:

1. *Schambaugh* discloses the design of a three cell modular battery. See FIG. 1.
2. *Schambaugh* does not disclose a controller as required in Applicants' Claim 1.
3. *Schambaugh* does not disclose electronic control of the modular battery or a controller electrically coupled to a battery cell.
4. *Shambaugh* only seeks to improve the housing design and reduce the overall weight of a group of cells. *See* col. 1, lines 26-32.

Thus, *Stewart* in view of *Schambaugh* does not suggest using Applicant's impedance operable controller. Applicants respectfully request that the Examiner withdraw this 35 U.S.C. § 103(a) rejection.

Further, Claims 15-22 were also rejected over *Stewart* in view of *Nagai.* Since Claims 15-22 depend directly from Claim 12, the limitations of Claim 12 are incorporated into dependent Claims 15-22. The previous arguments regarding the *Stewart* and *Nagai* references remains in effect and will not be repeated. *Stewart* in view of *Nagai*, for the reasons discussed previously, do not disclose, teach or suggest using Applicant's series connection of a first and second containers each containing a battery cell and controller responsive to a predetermined condition. Applicants therefore respectfully requests reconsideration and allowance of dependent Claims 15-22 over the Examiner's 35 U.S.C. §103(a) rejection.

Claims 2-11, 14-22, and 25-29 all depend either directly or indirectly from Claims 1, 12, or 24. Therefore, Claims 2-11, 14-22, and 25-29, contain all of the limitations of Claims 1, 12, or 24. For this reason, Applicants submit that the arguments made above concerning the allowability of Claims 1, 12, and 24 are equally applicable to the rejections of Claims 2-11, 14-22, and 25-29 under 35 U.S.C. §103(a). Applicants therefore request reconsideration and

allowance of dependent Claims 2-11, 14-22, and 25-29 over the Examiner's 35 U.S.C. §103(a) rejection.

IV. Conclusion

Based on the foregoing, it is submitted that each of Applicants' claims is in condition for allowance and favorable reconsideration is requested.

If there are any additional fees due and owing by reason of this amendment, the Examiner is hereby authorized to charge the Deposit Account (16-2480) of The Procter and Gamble Company therefor.

Respectfully submitted,

GARTSTEIN ET AL.

By _____

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 28 and 29 have been added.

Claims 1, 6, 12 and 24 have been amended as follows:

1. (twice amended) A battery [having a controller suitable for use in either a primary or secondary battery, said battery] comprising:

(a) a container having a positive terminal and a negative terminal;

(b) a battery cell <u>having an internal impedance</u> disposed within said container, said cell having a positive electrode, a negative electrode, [a ground to said negative electrode of said cell] and a cell voltage measured across said positive and said negative electrodes of said cell;

(c) a controller electrically coupled between said electrodes of said cell and said terminals of said container to form, from the cell voltage, an output voltage across the positive and negative terminals of the container[, said controller having a ground in common with said negative electrode of said cell]; and

(d) a circuit responsive to a predetermined condition of said battery, the circuit being operable to uncouple the output voltage of the controller from the terminals of the container upon detection of said predetermined condition[, said container further having a ground to said negative terminal, wherein said ground to said negative terminal is in common with either said ground common to said controller and said negative electrode of said cell, or is a virtual ground isolating said negative electrode of said cell from said negative terminal of said container] <u>substantially determined by said internal impedance</u>.

6. (twice amended) The battery of Claim 1 wherein said [cell has an internal impedance and said] circuit is operable for monitoring the cell internal impedance, the circuit being responsive to a predetermined condition including the cell internal impedance exceeding a predetermined impedance, [said predetermined impedance being known and greater than said cell internal

impedance,] the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition to generally prevent an over-discharge of the cell.

12. (twice amended) A multiple-cell battery [having a controller suitable for use in either a primary or secondary multiple-cell battery, said multiple-cell battery] comprising:

a first container having a positive terminal and a negative terminal;

a first battery cell disposed within said first container, said first battery cell having a positive electrode, a negative electrode, and a battery cell voltage measured across said positive and said negative electrodes of the first battery cell;

a first controller electrically coupled between the electrodes of said first battery cell and the terminals of said first container to create a first container output voltage measured across said first container positive and negative terminals;

a second container electrically coupled to said first container, said second container having a positive terminal and a negative terminal, wherein said positive terminal of said second container is connected to said negative terminal of said first container;

a second battery cell disposed within said second container, said second battery cell having a positive electrode, a negative electrode, and a battery cell voltage measured across said positive and said negative electrodes of the second battery cell [at least one of said first cell and said second cell having a ground to the negative electrode of that cell];

a second controller electrically coupled between said electrodes of said second battery cell and said terminals of said second container to create a second container output voltage measured across said second container positive and negative terminals, [at least one of said first controller and said second controller having a ground in common with said negative electrode of said respective cell]; and

a circuit responsive to a predetermined condition of said multiple cell battery, the circuit being electrically coupled to one of the first and second controllers to uncouple the respective one of the first and second container output voltages from the terminals of the respective one of the first and second containers upon detection of said predetermined condition[, said container further having a ground to said negative terminal, wherein said ground to said negative terminal is in common with either said ground common to said controller and at least one negative electrode of one said cell, or is a virtual ground isolating said at least one negative electrode of said cell from said negative terminal of said container].

24. (twice amended) A method for extending the useful life of a battery comprising the steps of:

providing a battery [having a controller suitable for use in either a primary or secondary battery] including:

(i) a container having a positive terminal and a negative terminal; and

(ii) a battery cell having an internal impedance disposed within said container, said cell having a positive electrode, a negative electrode, and a cell voltage measured across said positive and said negative electrodes of said cell;

the method being characterized by:

electrically coupling a controller between said electrodes of said cell and said terminals of said container to form, from the cell voltage, an output voltage across the positive and negative terminals of the container;

[providing a ground in common with said negative electrode of said cell and said controller

providing a ground to said negative terminal of said container

placing said;

placing said ground to said negative terminal in common with either said ground common to said controller and said negative electrode of said cell, or making said ground to said negative electrode a virtual ground, thereby isolating said negative electrode of said cell from said negative terminal of said container and]

in response to detection of a predetermined condition of the battery substantially determined by said internal impedance, uncoupling the output voltage of the controller from the terminals of the container.